

## INTELLIGENT PROCESS AUTOMATION –THE NEXT GENERATION TOOL FOR ROBUST DECISION-MAKING

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### ABSTRACT

*Intelligent Process Automation (IPA) or Cognitive Automation is an emerging technology that deals with integrating Artificial Intelligence and related new technologies including Computer Vision, Machine Learning and Robotic Process Automation. IPA enhances the cognitive abilities of software bots by bringing intelligence to them and paves the path for the software robots to mimic the way in which human brain works. In this context a research is undertaken to conduct sentiment analysis using IPA. Analyzing customer's opinion is an important way by which customer value can be created and enhanced. The research shows how a software bot can automatically scrape customer reviews pertaining to an automobile and analyze their sentiments. The analysis conducted by the cognitive bots with respect to automobile sector revealed that most of the positive reviewers are happy about the looks of the automobile, mileage, pickup, comfort and safety of the automobile whereas the negative customer reviews suggested that there is a negative sentiment value towards the engine of the car. The study highlights that a busy manager in the corporate world can engage IPA as an assistant in the place of a human being for conducting sentiment analysis for understanding the perceptions of people. This will be a very cost effective software mechanism for managers to take effective decisions in the shortest possible time and with least costs.*

**KEYWORDS:** Robotic Process Automation, Intelligent Process Automation, Bot & Artificial Intelligence

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### INTRODUCTION

RPA is a technology developed on software robots to perform certain repetitive tasks that allow them to control applications, collect data, feed them to other applications and manipulate data. The bots mimic the human behavior to execute an action. Intelligent Process Automation (IPA) or Cognitive Automation is an emerging technology that deals with integrating Artificial Intelligence and related new technologies, including Computer Vision, and Machine Learning to Robotic Process Automation. IPA enhances the cognitive abilities of the software bots by bringing intelligence to them and paves the path for the software robots to mimic the way in which human brain works. Over a period of time, the bots will be able to learn and do things even better than the humans. IPA aids the manager in taking decisions, accomplishing tasks and achieving organizational goals more quickly, effectively and efficiently. This synergy of technologies yields automation competencies that radically enrich business value, customer experience and competitive advantage of the organization.

An attempt is made in the current research paper to conduct sentiment analysis using IPA through web scraping technique.

## REVIEW OF LITERATURE

The roots of Sentiment Analysis are dated back to the studies conducted on the public opinions at the beginning of 20<sup>th</sup> century (Mäntylä, et al., 2018). The researcher presented a computer assisted literature review about the evolution of sentiment analysis and listed the top cited papers pertaining to this field using automated text clustering. Various real-life applications use different Sentiment Analysis algorithms. (Medhat, et al., 2014). The authors demonstrated an overview of the most recent updates in SA applications and their applications. They also concluded that Naïve Bayes and Support Vector Machine are the most frequently used Machine Learning algorithms. (Bhargava & Rao, 2018) applied Naïve Bayes and Support Vector Machine to conduct sentiment analysis on different types of cryptocurrencies using data of social media and concluded that the term 'virtual currency bit coin' and 'lite coin' has neutral sentiment while the terms 'cryptocurrency' and 'digital currency' has more positive sentiment. The machine learning algorithms can be used with various sentiment analyzers to determine the approach with highest accuracy rate for learning about sentiments (Hasan, et al., 2018). The authors analyzed the sentiment of the tweets about the elections in Pakistan by translating the tweets from Urdu to English. The applications of Sentiment Analysis range from Healthcare, HR, banking, Marketing, Manufacturing to Finance and many more. (Baracho, et al., 2012) applied a methodology to develop, examine and review sentiments extracted from web to the automotive industry especially for FIAT brand using ontology trees and concluded that Palio brand received more positive sentiment value and Gol brand received a mixed value while Corsa received negative sentiment value. In the field of tourism, (Rajan & V, 2017) applied text analytics to understand the relation between hotel visitors and their satisfaction in the destinations of Goa and Shimla by extracting the customer reviews from websites and classifying them accordingly into positive or negative opinions. Most works on sentiment analysis used texts to identify the sentiment polarity (Zou, et al., 2018). The authors stated the vital role played by the microblogging sites and proposed a method to analyze sentiments using social context and topic context.

However, since IPA is an emerging software technology, not many studies are undertaken yet, to show how sentiment analysis is done using IPA based on the customer reviews collected from the social media and other websites and applying web scraping technique. The current research is an attempt in this direction.

## SIGNIFICANCE OF THE STUDY AND STATEMENT OF THE PROBLEM

In today's global economy, the outlook of business has changed from providing customer satisfaction to creating customer value. Creation of customer value by the organization involves empowering them. In this regard, measurement of metrics helps in enhancing the perceived value of company's offering relative to competitors. The development in technology and the tremendous growth of social media platforms in day-to-day life has brought about reduction in the gap between the businesses and the customers as in the current times, social media has become a platform of communication for every means. According to Bright Local, 85% of consumers trust online reviews as much as personal recommendations. And HubSpot Research found that 60% of consumers believed customer reviews were either trustworthy or very trustworthy, which signifies that businesses that can accumulate positive reviews had a decent chance of pursuing a customer make a purchase decision. So, a time has come for businesses to make use of this huge data available by prudently listening and monitoring consumers' needs. Sentiment Analysis is one such tool that can further narrow down the gap by

providing actionable insights from studying the data generated by customers. Sentiment analysis can be performed using many platforms like R or python or RPA and IPA. The study is significant as it is the pioneering attempt in conducting sentiment analysis using IPA through web scraping technique.

## OBJECTIVE

The current research aims at demonstrating the process of conducting sentiment analysis using IPA and web scraping techniques with the assistance of software bots. Customer reviews relating to automobile industry are taken as the basis for performing sentiment analysis and to show how IPA can be leveraged as a potential tool by a manager as a time saving mechanism.

## METHODOLOGY FOR ACHIEVING THE OBJECTIVES

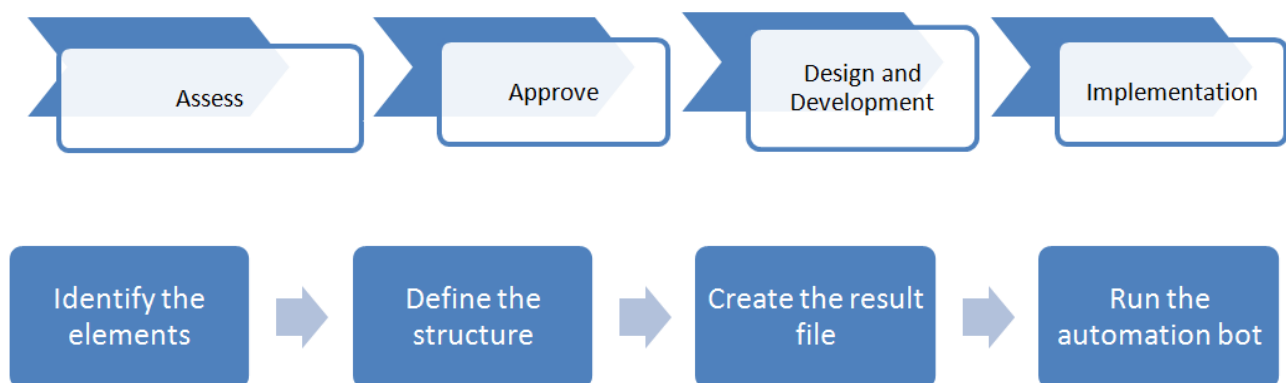
The study adopted the following methodology to achieve the objective set:

In RPA there are two types of bots for 3 different categories of tasks. An attended bot executes its automation on the user's local workstation and needs a human to trigger or schedule them. These are called Front Office Robots (FOR). An unattended 'bot' that runs on a virtual machine and executes automation that does not require user interaction. They can be triggered from a server. They are called as Back Office Robots (BOR). For the purpose of initiating the process of IPA, an RPA methodology has to be developed. The following description deals with the development of RPA methodology using for.

### RPA Development Methodology

The steps to automate the process using FORs are described below:

Any RPA development project should follow a structured stage-wise procedure. A typical APA development has the following four phases.



Asses phase begins with the investigation of the process that could be automated. Stage concludes by drawing the feasibility of the RPA project in more detail. Approve phase starts with the approval of the process which is to be automated. It is followed by a detailed investigation and documentation of the process. After documentation, the future robotic process will be designed. The stage generally ends with a business case being presented to the management team. Design phases commences by looking at which software best fulfils the criteria outlined in the business case. During this

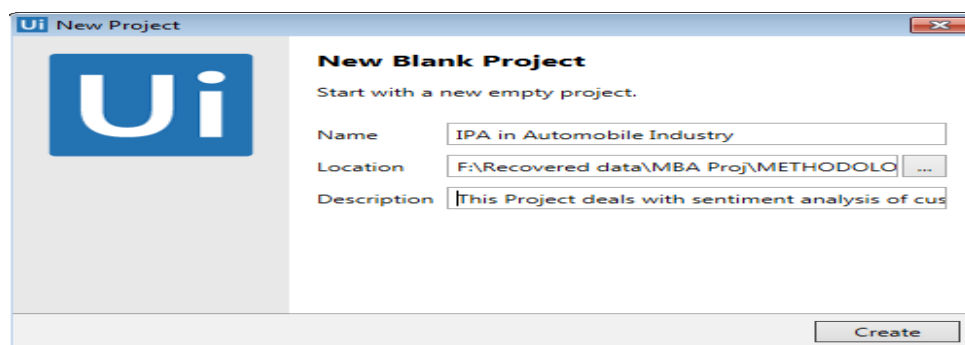
phase, the robot will be designed with the exact process. With agile iterations, the robot will be programmed to scale the level of automation. The stage ends with the testing of the robot. In the implementation phase, the robot is deployed into a working environment, mimicking the behavior of an employee. The current research project undertaken identifies the real time application of IPA in managerial administration and is worked upon, by using UiPath software. UiPath is a leading RPA tool and is user friendly and has a free community edition. It is a Graphic User Interface related tool for Robotic Process Automation as well as Intelligent Process Automation. It delivers a complete solution for application integration, automating applications, administrative and business IT tasks and processes. The managerial use case of IPA in the field of automobile is showcased with the help of customer reviews scraped from cardekho.Com by the bot for the product Maruti Swift 2018. Although the cognitive activities pack in the UiPath software provides with Stanford NLP Text Analysis, Google Text Analysis, IBM Watson NLU Text Analysis, and Microsoft Text Analysis to automatically process the information and analyze the sentiment, this project undertaken utilizes Microsoft Text Analysis to analyze the sentiment of the extract. When the URL of the website is provided, the bot navigates into that website and scrapes the data that is spanning through the website and then saves it into an excel file. Later using Microsoft text analytics, the sentiment value of the reviews is analyzed. The creation of an automation project requires the following steps:

**Step 1: Open UiPath Community Edition Software as Shown Below.**



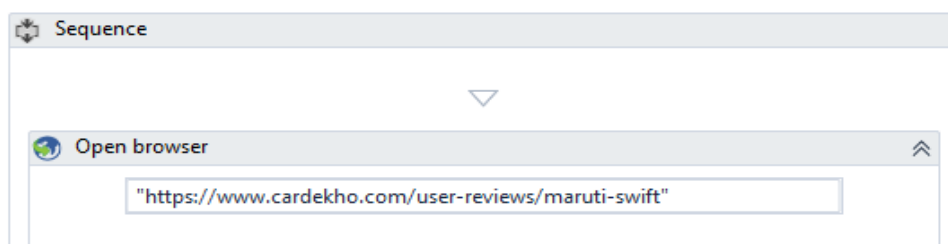
**Step 2: Creation of Blank Project**

Click on Blank to create a Blank Project, a window will appear asking for project name as shown below. Provide a name and to the project and also the description of the project and click on create, a project will be created as shown below.



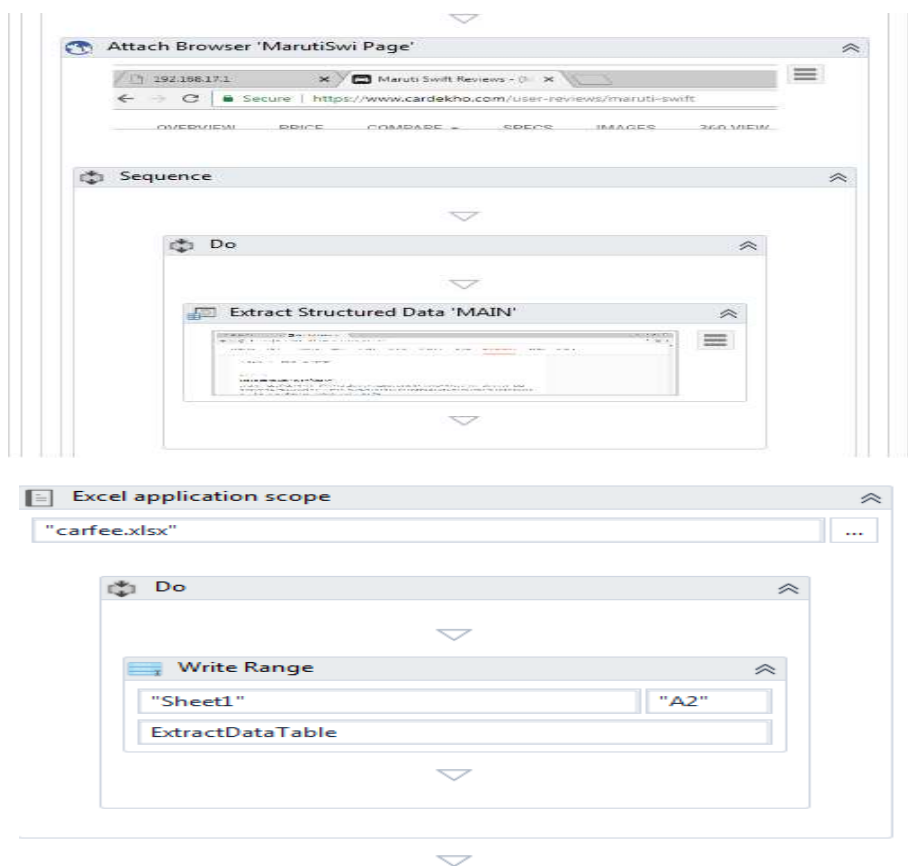
**Step 3: Selection of New Sequence**

On the design tab, in the File Group, select New Sequence. The New Sequence Diagram window is displayed. In the sequence add 'open browser' activity and provide the url of the website as shown below.



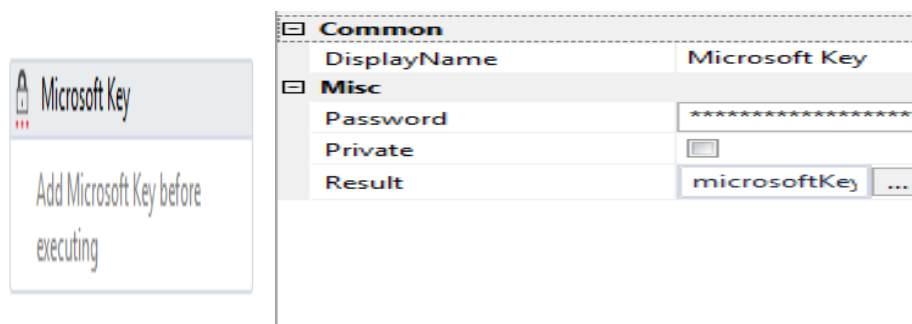
#### Step 4: Extraction of Data Through Data Scrapping

On the design tab, click on data scraping and extract the structured data from the website in the form of data table and store it in an excel file as shown below.



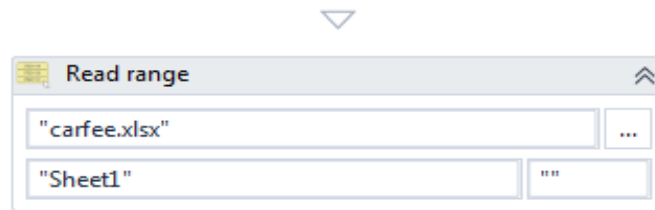
#### Step 5: Analysis of Sentiment Using Microsoft Text Analysis

Add Microsoft key to conduct sentiment analysis using Microsoft text analysis as shown below.



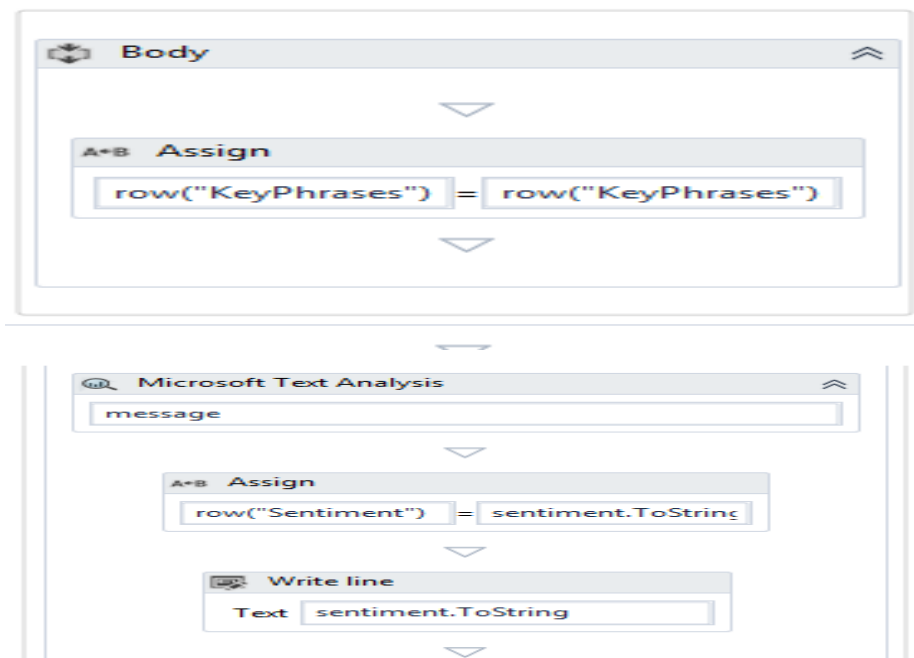
#### Step 6: Provision of Excel File to Analyze Sentiments

Provide the name of the excel file in which the data from website is scraped to conduct sentiment analysis as shown below.



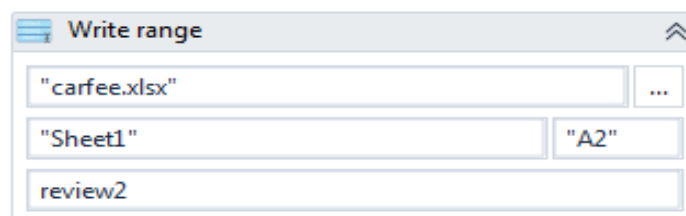
#### Step 7: Inclusion of 'Assign activity

Add an 'assign activity' to assign the sentiment value as well as key phrases to the text extracted into the excel file as shown below.



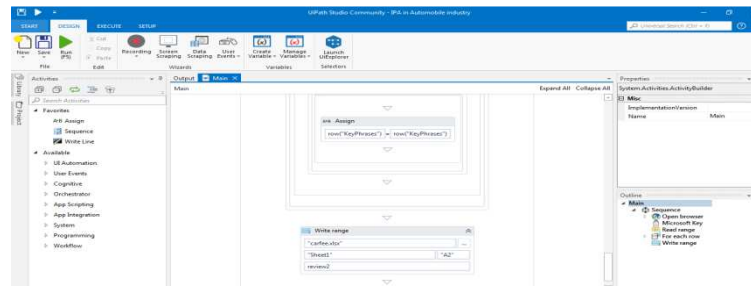
#### Step 8: Extraction of Sentiment

Add a 'write range' activity to mark the sentiment value and the key phrases of the analyzed excel file as shown below.



#### Step 9: Execution of Automation Project

Click on the execute button to run the bot and execute the process of automation as shown below.



## OUTCOME OF THE RESEARCH

The outcome of the project undertaken encompasses the extraction of relevant information from given customer reviews such as the overall sentiment and key phrases by using Microsoft Text Analysis provided in the UiPath software pertaining to automobile industry for the product Maruti Swift 2018 which helps in giving accurate insights to the manager. The sentiment value can range from 0 (negative), 0.5 (neutral) to 1 (positive) as depicted below. From the extracted 80 customer reviews, 7.5% of the reviewers have neutral sentiment value towards the Maruti Swift and 10% of the reviewers have negative sentiment towards the car while 82.5% of the reviewers have positive sentiment value about the product as shown below. From the key phrases, it can be concluded that most of the positive reviewers are happy about the looks of the automobile, mileage, pickup, comfort and safety of the car whereas the customer reviews suggested that the people have negative sentiment value towards the engine of the car.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Message	Sentiment	KeyPhrases												
2	I own a Maruti Swift from the past 5 years. I bought it when there was no good competitor in the race, unlike today. I will like to share my overall experience with the car. I found the car nice when I took a test drive. The power delivery is good and the engine noise is also not that loud. Interiors were also good at that time. Swift, since its i...	0.934523847434998	good competitor; car nice; Maruti Swift; power delivery; engine noise; years; test drive; overall experience; Interiors; time; race;												
3	My mom on her birthday decided to gift herself a car and surprisingly bought Maruti Swift. She was in battle between Ritz and Swift. But she made a bold move and 4 years since it seems the right move. The car with its elegant design turns everybody on. The front panel excites everyone and is trendy in looks. It's very much appealing. Also i no...	0.974743127822876	car; Maruti Swift; years; birthday; battle; Ritz; elegant design; panel; appealing; mom;												

**Figure 1: Depicting the Customer Reviews Extracted, Sentiment Value and Key Phrases**

The figure displays two screenshots of an Excel spreadsheet titled 'carter - Excel (Product Activation Failed)'. The spreadsheet contains customer reviews for the Maruti Swift, categorized into positive, negative, and neutral sentiments based on sentiment analysis scores in column B.

**Top Screenshot (Reviews 65-87):**

Review ID	Review Text	Sentiment Score (B)
65	I decided to buy the Maruti Swift among many other...	0.94039601039886
66	The Maruti Swift VDI diesel is the top level variant...	0.93589730739594
67	Definitely a cool car, the Maruti Swift has quickly be...	0.95640727386371
68	We purchased the Swift from the most trusted ind...	0.5
69	The Swift was marketed in the Japanese domestic...	0.5
70	Good Car India&#39;s hottest hatchback has been...	0.5
71	Interior: Black interiors with matching seat covers...	0.5
72	My budget was around 6 lakh and I also wanted bas...	0.5
73	In India we have kind of a ritual, wherein things are...	0.5
74	I found the ride to be slightly improved over the pr...	0.0715810060501099
75	Maruti Swift is hatchback car launched by maruti fo...	0.206534096373749
76	I bought this car one year ago. The power steering...	0.23137095015551
77	Purchased a Maruti Swift Ldi BSIII Grey in May 2008...	0.303050190210342
78	Description : I am driving the Swift Vdi for one year...	0.13866023581805
79	Mileage Best Featureshello sir&#39;&#39;&#39; maruti co...	0.125157649002075
80	Comfort: Amazing comfort, no problems over speed...	0.242357701063156
81	The car has got decent looks. I liked the ambience...	0.157966115055084
82		
83	Total no. of positive reviewers	66 82.5
84	Total no. of negative reviewers	6 7.5
85	Total no. of neutral reviewers	8 10
86		
87		

**Bottom Screenshot (Reviews 66-87):**

Review ID	Review Text	Sentiment Score (B)
66	The Maruti Swift VDI diesel is the top level variant...	0.93589730739594
67	Definitely a cool car, the Maruti Swift has quickly be...	0.95640727386371
68	We purchased the Swift from the most trusted ind...	0.5
69	The Swift was marketed in the Japanese domestic...	0.5
70	Good Car India&#39;s hottest hatchback has been...	0.5
71	Interior: Black interiors with matching seat covers...	0.5
72	My budget was around 6 lakh and I also wanted bas...	0.5
73	In India we have kind of a ritual, wherein things are...	0.5
74	I found the ride to be slightly improved over the pr...	0.0715810060501099
75	Maruti Swift is hatchback car launched by maruti fo...	0.206534096373749
76	I bought this car one year ago. The power steering...	0.23137095015551
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81	The car has got decent looks. I liked the ambience...	0.157966115055084
82		
83	Total no. of positive reviewers	66 82.5
84	Total no. of negative reviewers	6 7.5
85	Total no. of neutral reviewers	8 10
86		
87		

**Figure 2: Depicting the Positive, Neutral and Negative Sentiment Value of the Customer Reviews**

## COMPETITIVE ADVANTAGES IPA APPLICATION

In recent years, although the base of Sentiment analysis has shifted from analyzing online reviews of products to social media texts; and is conducted using various algorithms and platforms, the main difficulty lies in the extraction of the data for analyzing the sentiment, which would be otherwise overcome by using Intelligent Process Automation as IPA is an emerging technology that deals with integrating Artificial Intelligence and related new technologies, including Computer Vision, Cognitive automation and Machine Learning to Robotic Process Automation. With a single click of mouse button, IPA helps the businesses to derive meaningful insights from the customers' reviews as the 'bot' assists the managers to fetch the data from the websites. New leads can be generated from the key phrases of target audiences and this process of automation can be scaled and applied to other domains in which the organization are concerned in monitoring opinions about their products and services.

## FURTHER SCOPE OF THE PROJECT

Sentiment analysis using IPA with the assistance of software bots can be applied to various domains namely healthcare, manufacturing, education, finance, tourism, advertising etc. With the help of bots equipped with cognitive abilities like Language detection, Computer Vision, Cognitive automation, Machine Learning applications, which enhance business value and act as a basis for complex decision making can be developed.



## CONCLUSIONS

In the present study, the potential of IPA as a next generation tool is unleashed through a managerial use case in automobile industry. It focused on how a busy manager in the corporate world can engage IPA as an assistant in the place of a human being for fetching the useful data from the websites and to analyze the end users more effectively thereby delivering more productive, efficient and effective results.

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